Neural mechanisms of third-party affective touch experiences

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Humans can effortlessly extract the affective meaning of touch delivered to another person`s skin as well as their own. Interpersonal touch communication conveys discrete emotion and intention. For example, we can easily imagine experiencing a warm feeling when observing a person being hugged. Previous findings about simple touch observation suggested that this phenomenon could be linked to somatosensory resonance and the theory of mind (ToM). Yet, concerning more complex interpersonal affective touch, our understanding of how such mechanisms work is still limited. Thus, in the current study we generated a novel socio-affective touch database of 39 stimulus videos, covering both pleasant (e.g., hugging a person) and unpleasant (e.g. slapping a person) touch scenarios, and investigated how the human brain processes different types of interpersonal affective touch during passive observation. First, 21 participants evaluated pleasantness and arousal of each touch video. Subsequently, the same participants watched the same videos in the scanner. Importantly, we also provided the participants with both positive and negative touch stimulation in the scanner to capture actual touch sensitive cortices which we used as parts of regions of interest (ROI) along with social brain regions. Using correlational multivariate pattern analysis (MVPA) methods, neural spaces of affective touch were obtained in ROIs, followed by multiple regression analysis between the group neural matrix in each ROI and affective ratings. The results suggest that both actual touch sensitive cortices and social brain regions represent valence information after controlling the effects of arousal and other visual factors. Our findings highlight the involvement of social understanding and a mirror somatosensory system during observation of other`s affective touch interactions in the absence of actual touch.

Figure 1: The figure shows representative still frames from the stimulus videos, showing different types of affective touch events (positive (the first six stimuli in the 1st, the 2nd and the 3rd rows), neutral (the last stimuli in the 1st, the 2nd and the 3rd rows) and negative touch events (six stimuli in the 4th, 5th and the 6th rows)).